

Financial Models for Electric Utility Market Transformation

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Project Description

To increase the speed and scale of Energy Efficiency / Distributed Generation / Renewable Energy (EE/DG/RE) project development, there must be significant financial incentives to encourage utility companies to transform existing business models. This research developed a financial model of a sample utility to understand:

- 1) The degree to which their revenues and finances will be impacted by DG projects
- 2) What alternative financial models might create new sources of revenue and viable reductions in utility companies' risk.

The economic effects of DG are analyzed in the energy market by separating it into three primary participant models: generator, distributor, and consumer. For this study, the research focused on the consumer choice to install DG and the resulting effects on the costs and incomes to the generator and distributor as they adjust their output. This model was built from contract and rate data between Platte River Power Authority (PRPA) and Fort Collins Utilities (FCU) as well as the various available rate structures available for the consumers within the FCU distribution region.

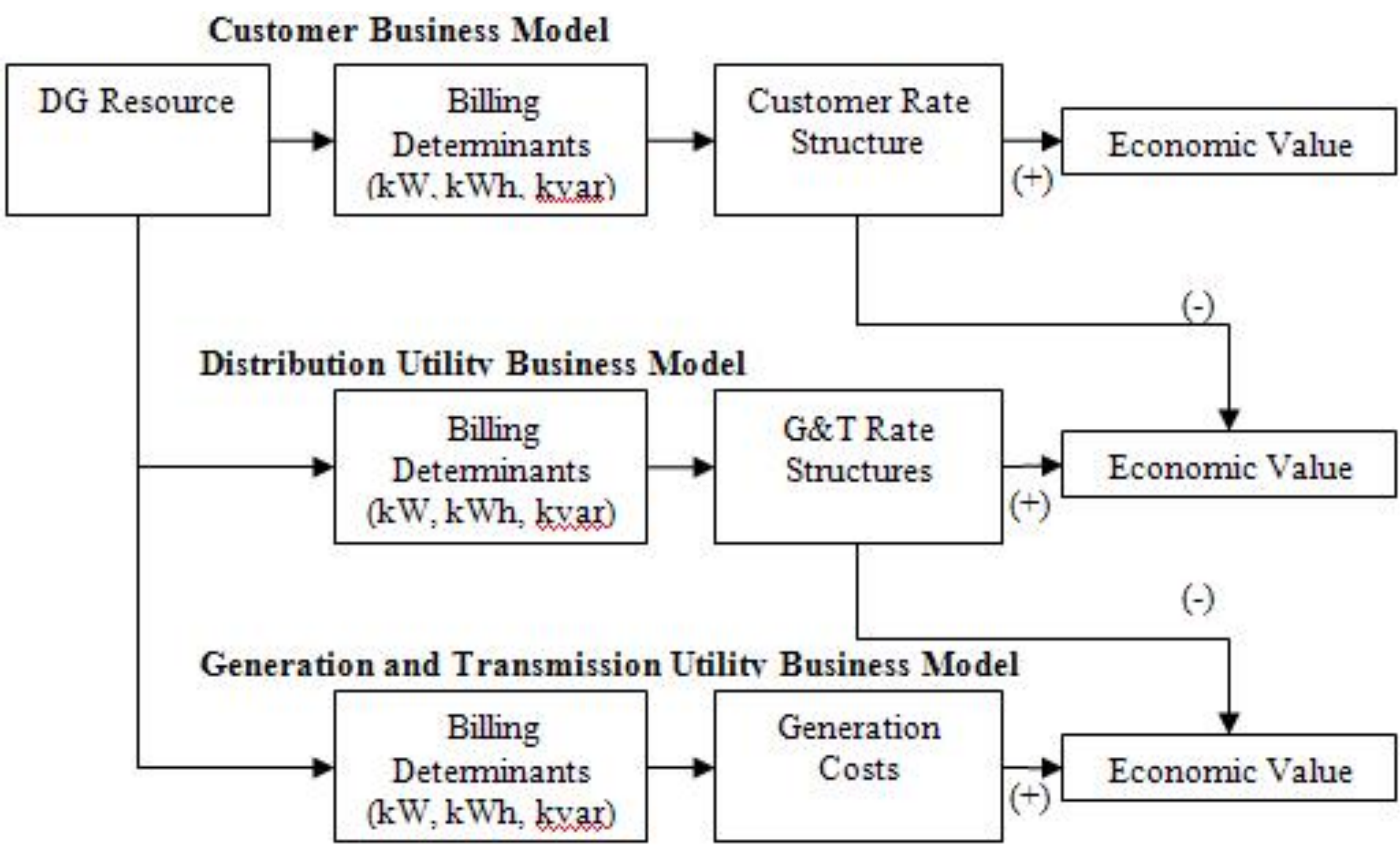


Figure 1. Energy Market Economic Model: (+/-) represents positive or negative DG incentives

Results

The results of this research demonstrate that existing business models cause both the distribution and G&T utilities to lose value when a consumer builds a DG resource for his/her own optimal economic benefit. These business models do not allocate the costs and benefits among all three stakeholders and are not successful or sustainable. The operation of the DG resource costs the distributor and generator more value than the consumer can possibly save. This explains most utilities’ reticence to take part in large “game-changing” DG programs such as the “Fort Zed Project” in Fort Collins, Co. Economically efficient and viable business conditions that could foster development into DG and related technologies require a new business model.

Consumer Model			Distribution Model			Generator Model		
Without DG	Billing Info	Rate	Without DG	Billing Info	Rate	Without DG	Billing Info	Rate
DG Levelized Costs	0 kW	0.11 / KW / h	Revenue:			Revenue:		
Fixed Charge	1 acct.	\$18.36 / acct.	Consumer Payments		\$3,887	Distributor Payments		\$3,018
Demand Charge	150 kW	\$12.80 / kW						
Distribution Charge	150 kW	\$4.82 / kW	Costs:			Marginal Costs:		
Energy Charge	50000 KWh	\$0.0248 / kWh	Demand Charge	150 kW	\$12.42 / KWh	Marginal Cost of Gen.	0 kWh	\$0.08751 / kWh
Tax and Franchise		6% of subtotal	Energy Charge	50000 kWh	\$0.0231 / kWh	DG Marginal Cost		\$0
Total		\$4,135	Total Costs		\$3,018			
With DG			With DG			With DG		
DG Levelized Costs	50kW	0.11 / KW / h	Revenue:			Revenue:		
Fixed Charge	1 acct.	\$18.36 / acct.	Consumer Payments		\$2,897	Distributor Payments		\$2,292
Demand Charge	100 kW	\$12.80 / kW						
Distribution Charge	100 kW	\$4.82 / kW	Costs:			Marginal Costs:		
Energy Charge	45434 kWh	\$0.0248 / kWh	Demand Charge	100 kW	\$12.42 / KWh	Marginal Cost of Gen.	-50 kWh	\$0.08751 / kWh
Tax and Franchise		6% of subtotal	Energy Charge	45434 kWh	\$0.0231 / kWh	DG Marginal Cost		(\$400)
Total		\$3,584	Total Costs		\$2,292			
Monthly Value of DG		\$551			(\$264)			(\$326)

Figure 2. Results: Failure of the Traditional Energy Market.
Economic model results from a sample case (50 kW DG Installation)

Future Research

Several technical benefits of DG such as capacity deferral, ancillary services, reductions of system losses, and many others have been quantified by previous studies. However, because DG is not dependent on economies of scale or scope but rather on economies of mass production, the traditional utility business model has difficulty quantifying these benefits. More importantly, unless the three participants cooperate in the siting and control of DG and share in the costs and profits, any DG installation is likely to cause more harm than good to the total social welfare of the market (although a single participant might find some individual gains). The final JISEA report proposes several new economic models which could be further developed and expanded into a viable economic alternative for the energy market.